

PATENT CLAIMS

1. Device for non-contact transmission of electrical signals and/or energy between at least two parts mobile relative to each other, wherein a plurality of defined electromagnetic coupler elements is provided on the parts between which signals and/or energy is to be communicated, with the near field of these coupler elements causing the non-contact transmission,
characterised in that each of said coupler elements, which are provided on at least one part, comprises at least one resonator consisting of a single element able to resonate per se and independently of the other coupler elements, which has a resonance frequency approximately equal to the frequency of the signals to be transmitted, and
- that the individual resonators are connected to each other via line which is terminated in a manner free from reflection.
2. Device according to Claim 1,
characterised in that said resonator or resonators is/are resonating cavities, line resonators, dielectric, ferromagnetic and/or piezoelectric resonators.
3. Device for non-contact transmission of electrical signals and/or energy between at least two parts adapted to be moved relative to each other, wherein a plurality of defined electromagnetic coupler elements is provided on the parts between which signals and/or energy are to be transmitted, with the near field of said coupler elements causing the non-contact transmission,
characterised in that said coupler elements on at least one part

- form a conductor structure configured as cascade circuit which is terminated in a manner free from reflection, and
- that each coupler element, independently of the other coupler elements, is a resonance system having a resonance frequency higher than the highest frequency of the wide-band signals to be transmitted.

4. Device according to Claim 3,
characterised in that the system formed by said coupler elements presents a low-pass characteristic.
5. Device according to ^{claim 3}~~Claim 3 or 4~~,
characterised in that said conductor structure in its entirety is not capable of resonating.
6. Device according to ^{claim 1}~~any of the Claims 2 to 5~~,
characterised in that each coupler element able to resonate consists of an element including at least one component producing an inductive and capacitive effect, and that the joining coupler element taps the voltage or the current, respectively, on at least one dummy element of the preceding coupler element as input signal.
7. Device according to Claim 6,
characterised in that each coupler element is composed of at least one, preferably a single, inductor and at least one capacitor.
8. Device according to Claim 7,
characterised in that the individual inductors of the various coupler elements of one part are connected in series.

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9. Device according to ^{Claim 1}~~Claim 7 or 8~~,
characterised in that a continuous line forms the individual inductors of the respective coupler elements.
10. Device according to Claim 9,
characterised in that the capacitors are configured as flat conducting elements which are connected to said continuous line via branch lines or are directly joined to the line laterally.
11. Device according to Claim 10,
characterised in that flat conducting elements are provided on either side of said continuous line.
12. Device according to ^{Claim 1}~~any of the Claims 6 to 11~~,
characterised in that said inductors or capacitors are configured as structures of a printed circuit board.
13. Device according to Claim 12,
characterised in that said printed circuit board is a flexible board.
14. Device according to Claim 13,
characterised in that said printed circuit board is provided with slots.
15. Device according to ^{Claim 1}~~any of the Claims 6 to 14~~,
characterised in that said inductors and/or capacitors are discrete elements.
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16. Device according to ^{Claim 1}~~any of the Claims 1 to 15~~,
characterised in that several coupler elements tuned to different frequency ranges are disposed in a close three-dimensional relationship such that a coupler structure is achieved which is tuned to these frequency ranges.
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- a 17. Device according to ~~any of the Claims 1 to 16,~~ ^{Claim 1}
characterised in that said structure is symmetrical.
- a 18. Device according to ~~any of the Claims 1 to 17,~~ ^{Claim 1}
characterised in that conductor structures with a ground surface, capacitors and/or inductors are provided on either side of a printed circuit board.
- a 19. Device according to ~~any of the Claims 1 to 18,~~ ^{Claim 1}
characterised in that said coupler elements are configured as differential coupler elements and that a differential signal is applied to said coupler elements.
- a 20. Device according to ~~any of the Claims 1 to 19,~~ ^{Claim 1}
characterised in that coupler elements able to resonate and matched with each other are provided on all parts.
- a 21. Device according to ~~any of the Claims 1 to 20,~~ ^{Claim 1}
characterised in that coupler elements able to resonate are provided on one part, and that conventional transmitters or receivers are provided as coupler elements on the other parts.
22. Device according to Claim 21,
characterised in that said transmitters or receivers, respectively, comprise coils, ferrite cores and/or capacitors.
- a 23. Device according to ~~any of the Claims 1 to 22,~~ ^{Claim 1}
characterised in that the signals or the energy to be transmitted for supply or the line systems, respectively, which serve to pass on the transmitted signals or the energy are shielded and thus designs de-coupled from said coupler elements.

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24. Device according to ~~any of the Claims 1 to 23,~~ ^{Claim 1}
characterised in that at least one activator unit is provided which activates the respective coupler element only when the coupler elements of a relatively moved part are approaching.
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25. Device according to ~~any of the Claims 1 to 24,~~ ^{Claim 1}
characterised in that said coupler elements are so designed that they adjust themselves in terms of their electrical characteristics to their operating point only by the dielectric or magnetic characteristics of an approaching coupler element.
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26. Device according to ~~any of the Claims 1 to 25,~~ ^{Claim 1}
characterised in that the coupling of said coupler elements to said line system is performed by additional active or passive devices such as amplifiers and/or semiconductor switches.
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27. Device according to ~~any of the Claims 2 to 26,~~ ^{Claim 1}
characterised in that said coupler elements are shielded from the environment by a shield made of an electrically conductive material.
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28. Device according to ~~any of the Claims 2 to 27,~~ ^{Claim 1}
characterised in that said coupler elements are supplied by a switching or amplifying element.
29. Device according to Claim 28,
characterised in that an additional signalling means is provided which generates a regenerative coupling signal for said switching or amplifying element, on the basis of voltages and currents of the resonant elements, such that oscillation will occur on at least one resonance frequency.

30. Device according to Claim 29,
characterised in that said signalling means is so configured that it couples out one magnitude proportional to one part of a series resonance current.
31. Device according to Claim 29,
characterised in that said signalling means is so designed that it couples out one magnitude proportional to one part of a parallel resonance voltage.
32. Device according to Claim 29,
characterised in that in the case of several resonances said signalling means is so designed that it couples out a combined signal consisting of a magnitude proportional to a series resonance current and proportional to a parallel resonance voltage.
- a 33. Device according to ^{Claim 1} ~~any of the Claims 29 to 32~~,
characterised in that an additional secondary oscillator is provided to facilitate the commencement of the oscillation of the circuit.
- a 34. Device according to ^{Claim 1} ~~any of the Claims 29 to 33~~,
characterised in that an analyser means is provided which determines the operating frequency of the system and derives therefrom a signal in correspondence with the size of the spacing of said units adapted to be moved relative to each other.
- a 35. Device according to ^{Claim 1} ~~any of the Claims 1 to 34~~,
characterised in that said parts adapted to be moved relative to each other perform a rotating movement.

claim 1

36. Device according to ~~any of the Claims 1 to 35,~~
characterised in that said parts adapted to be moved rela-
tive to each other perform a translational movement.

[illegible]